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ABSTRACT

Lesson plans for 21 activities in environmental studies are included in this student handbook, a companion to the Sandburg Environmental Education (SEE) program teacher handbook. The program emphasizes the integration of environmental studies in the existing curriculum; accordingly, the handbook provides five lessons with environmental emphasis for art, four for social studies, one on litter analysis, five for math, four for language arts, and two for science. Plans include objectives of the activity, materials needed, instructions (to student and/or teacher), worksheets for some activities, and evaluation suggestions for some. Most activities are carried out on or near the school site, with follow-up activities in the classroom. Many activities are interdisciplinary in nature; a social studies activity, for example, titled "Seeds, A Chain of Life" includes collecting, categorizing, measuring, and drawing seeds as well as descriptive and narrative writing about seeds. Math activities include estimating distances in standard and metric units and using a compass to map small areas. Language arts activities focus on careful observation and description of the environment. Suggested science activities are study of plant succession and estimation of insect populations. (JH)

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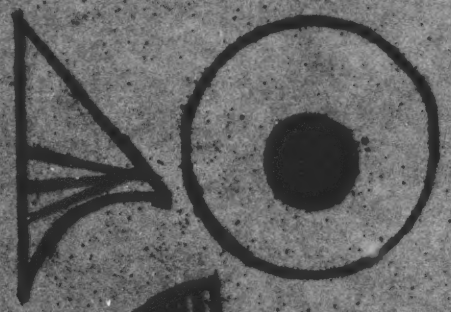
SEE PROGRAM

HARRISBURG ENVIRONMENTAL EDUCATION



STUDENT HANDBOOK

[1976]

ACTIVITY: ART - OBSERVE CLOSELY AND SHARPEN YOUR SENSES

Objectives:
1. To instill habits of closer observation and awareness.
2. To make children more aware of design in the natural world around him.

Activity: Make a list of objects relating to 1) texture, 2) shapes, 3) density, and 4) colors using the descriptions listed under each of these four headings below:

1. Discover objects relating to texture which can be described as slick, hard, rough, soft, slimy, velvety, coarse, knobbed, ribbed, furry. List them.
2. Find things with these shapes--small, large oval, round oblong, lobed, ridged, smooth-edged, rough-edged, triangular, pointed, curved, billowy, horizontal. List them.
3. Find things with relation to density--narrow, large, small, tall, short, thick, heavy, bulky, miniature. List them.
4. Find these colors--reds, greens, yellows, white, gray, blue, purple. List them. (example: red flowers, green leaves, etc.)

ACTIVITY: ART - FIELD ART, SCULPTURE AND CONSTRUCTING

Materials: Found objects, glue.

Objectives:
1. To offer the challenge of expressing ideas in many three-dimensional media.
2. To offer the opportunity to explore, observe and imagine.
3. To help students in the appreciation of three-dimensional form and construction.
4. Pupils will demonstrate artistic use of natural materials.

Activity:
1. Gather burs (burdock, cockleburs), dried weeds, grasses, twigs, leaf stems, leaves, seeds, etc.
2. Make some artistic object using above objects. Make into baskets, animals, relief pictures, birds, insects, etc. Twigs or leaf stems may be used for legs, ears, and whiskers.
3. Demonstrate artistic insight by combining natural materials with burs, etc., as grass for animal whiskers, corn silk for hair, etc.
4. An outline drawing may be made of some animal, bird, insect, etc. Fill in between the contour lines with stalks, stems, twigs (dead weed stalks work very well), vines, as in a mosaic.

Evaluation: Each pupil will complete one sculpture or relief picture.

ACTIVITY: ART - FIELD ART, SHAPES AND LINES IN NATURE

Objectives: Increase powers of observation. By observing specific shapes the pupils will relate basic art concepts to outdoor activities.

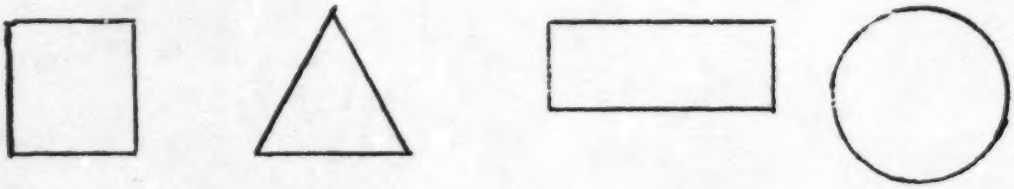
Activity:
1. After or while walking in the area, children will mark the lines they have seen on paper, using the chart below.
2. Following the shapes recorded on the chart children should then make a drawing or design based on some of the things they saw on their hike.

Worksheet for Shapes and Lines in Nature

Beside each description write the name of something that you saw.

1. Straight
2. Stiff/rigid
3. Heavy
4. Strong
5. Circle
6. Wavy
7. Weak
8. Thorny
9. Jagged
10. Zigzag
11. Light
12. Nervous
13. Peaceful
14. Joyful/Sad
15. Dancing
16. Graceful
17. Rippling
18. Waving
19. Exciting

What things did you see that had the following shapes?



What colors did you see?

How many shades of brown did you see?

How many shades of red did you see? Don't forget to look at buildings.

ACTIVITY: ART - FIELD ART--DRAWING WITH NATURAL DYES, ROCKS, BONFIRE CHARCOAL, etc.

Objectives:
1. Pupils learn that some plants yield natural dyes suitable for drawing.
2. Pupils will learn the artistic value of using natural products for drawing natural objects.

Activity:
1. Observe interesting things you see on the field trip, such as bugs, roots, nuts, flowers, plants, bones, trees, scenes.
2. Collect plants to test for color quality.
   a. Grasses, leaves, bark, flowers, sticks, rocks, or any other natural object.
   b. Care should be taken that no protected or scarce plants are gathered; only abundant ones.

3. After gathering materials children should draw pictures beginning with a pencil or start directly with the color by using a stem or bloom, etc. Plants are rubbed onto the paper for colored areas.

Evaluation: Each child should complete one picture using natural dyes.

Materials: Unlined paper, pencil, natural found objects.

ACTIVITY: ART - FIELD ART DRAWING

Materials: Unlined paper, pencil

Objectives:
1. To instill habits of closer observation and awareness.
2. To help students be aware of the beauty in natural surroundings.

Activity:
1. Find a plant or an object casting a shadow. Make a contour or outline drawing of the shadow. This may be complete as a contour line drawing or may be taken back to the classroom and painted with watercolor or tempera paint. Paint imaginatively.
2. Study closely a small section of nature (such as a square inch of anything). Draw a real close-up, an ant's eye view. Fill the paper with the square inch you see in nature, making things much larger than they really are.

Materials: Unlined paper, pencil.

Evaluation: Choose one of the two suggestions above. Each child should complete one picture.

ACTIVITY: SOCIAL STUDIES - SEEDS, A CHAIN OF LIFE

Objective: Almost all living creatures in the world depend on plants for life.

Generalizations: We eat the seeds themselves.
We eat the plants that grow from seeds.
Animals eat seeds and plants that grow from seeds.
We breathe the oxygen that comes from plants.
We eat the animals that eat the plants that grow from seeds.

Learning Activities:

1. Find seeds, make notes of:
   a. Size
   b. Color
   c. Shape
   d. Texture
2. Find examples of seed dispersal, make notes of method of dispersal
   a. Wind
   b. Water
   c. Carriers
   d. Other

Other Activities:

Draw as many different seeds as can be found.
Describe seeds in words
Measure size of seeds.
Personalize a seed in a story.

Evaluation: Student will be able to identify and classify any given seed in its dispersal category.

ACTIVITY: SOCIAL STUDIES - USE OF NATURAL RESOURCES

Objectives:

1. Student will list the natural resources which they observe.
2. From this list the students, in groups, will discuss (write) how they will meet their basic needs (food, clothing, shelter) by using only the observed natural resources.

SAMPLE CHART

Natural Resource	How Natural Resource Will be Used

Materials: Paper, Pencil

ACTIVITY: SOCIAL STUDIES - ENVIRONMENT, LOOKING BACK

Objectives:

1. The student will draw a map of the surrounding environment as it looked 150 years ago.
2. The student will be able to plan out how to settle a land area for survival.
3. The student will be able to list the scarce resources in the environment and how they would provide for or manage without them.

Description: You're the first people to arrive in this area. Imagine the way it was originally before any of the man-made structures (buildings, bridges, paths, etc.) Your group of five families has decided to settle here and be as self-sufficient as possible.

There is a need for assessment of the natural resources, as well as the lay-out of the environment in regard to the basic needs for survival.

Activity:

1. Have groups of 3-5 students draw the surrounding environment the way they imagined it 150 years ago.
2. Have the groups list what they need for survival.
3. Have the groups map off how they're going to settle the area.
   a) How many houses? Where?
   b) Any farm lands? Farm buildings?
   c) Leave any wooded areas?
   d) Need for any other buildings, etc.?
   e) Need for any man-made water holes?
4. Have groups make a list of needed resources that are scarce in this area.
   a) What are these resources needed for?
   b) How are you going to get these resources?
   c) Are you able to substitute any resources for the scarce one?

Materials Needed: Paper for map sketching
Notepaper
Pencils

ACTIVITY: SOCIAL STUDIES - IMPROVING THE ENVIRONMENT: Conservation-Architect

Objective:

1. From observation of the surrounding environment, the student will be able to state the purpose for what the environment is used.
2. The student will be able to give suggestions how the environment may be improved to better meet its purpose, but still conserve the natural environment.

Activity: Each student, or group of students, should consider himself a conservation architect.

He looks at the environment and decides what the purpose (fucntion) of it is (recreation, manufacuring, educating, etc.) or what the environment could be used for. Then sketching out (making a "blueprint") the area on a piece of paper he plans how the environment could be improved, still keeping conservation in mind.

Label any man-made structure as well as natural surroundings, to complete the land area.

ACTIVITY: ALL - LITTER ANALYSIS

Litter, weathering, and man's lack of action are a few of the problems we now face. Modern man is the greatest producer the world has ever known. The more consumables he produces, the more disposable material there is. Thus, the real problem is what to do with the products man cannot totally consume or use for further production of goods. Man's first temptation, in many instances, is to throw the unconsumed products in the first available place and walk away. This accounts for much of the litter you see.

Objective: Discover your environment, litter, weathering, and man's lack of action.

Activity: Gather litter you find in the area, bringing it near waste cans provided in the area. Separate and record the litter using the list below (List A).

Also, identify those objects or areas in need of attention and correction because of weathering or man's lack of proper action (List B).

A. Litter Objects:

Item	Tally
Broken glass	____
Cans	____
Cigarette/cigar butts	____
Paper	____
Matches	____
Plastic materials	____
Milk cartons	____
Bottle or can tops	____
Gum and candy wrappers	____
Bottles	____
Loose wire	____
Crayons or parts of pencils	____
Ashes from burning	____
Rubber bands	____
Pieces of cloth	____
Pieces of metal	____
Pieces of old toys	____
Others	____

B. Weathering or lack of Action:

Area	Corrective Suggestion
Broken windows	_____
Mud holes or low wet places	_____
Car and hike ruts	_____
Boken street lights	_____
Soil erosion area	_____
Objects needing paint	_____
Drainage problem	_____
Lack of grass cover	_____
Decaying materials causing odors	_____
Holes in roads and streets	_____
Overflowing trash	_____
Stagnant water accumulation	_____

SEE [redacted]

ACTIVITY: MATH - DEVELOPING DISTANCE PERCEPTION (The 100-Foot Exercise)

Objectives: To improve percepts of distance.
To clarify measurement concepts.

Materials Needed: Stick marked with name for each child (can make their own)
Four flags or markers (white, black, red, green) made by taping a strip of cloth onto the looped end of a stiff wire (coat hanger wire) or stick.
Several yardsticks.
50- or 100-foot measuring tape.
200 feet of twine.

Preparation: In an open field, place a marker in position, attach the twine and extend it in a convenient direction for about 200 feet.

Activity:

1. Sight Guessing. Begin at the reference marker. Ask the children to back away from this marker along the twine, each placing his white flag at a point he guesses to be 100 feet from the reference marker.

   Caution the children to use their own judgment. When all flags are in place, have them step away to note the range of the guesses, clusters of flags. Locate the median. Leave flags in place.

2. Estimating. Have pupils repeat the process using a part of the body (step, length of foot, etc.) to aid in making the estimate. Mark this estimate of 100 feet with the black flags. The range probably will narrow on this attempt and students will appear to have a "better" idea of the interval than at the first guess.

3. Measuring. Each student should now measure out the distance interval (Using yardstick) and mark with the red flag. The range should narrow to only a few inches. Students will now want to know who was closest - in guessing, estimating and in measuring. Reiterate that three approaches have been used. We still have a range and we still don't know exactly where the 100-foot point lies. Can we ever know?

   Next, pairs of students should repeat the exercise using tapes and placing green flags. Even now a range of a fraction of an inch will be evident. Analyze and discuss the reasons for this range.

   Exercise may be repeated with other distances. Exercise may be done in meters.

ACTIVITY: MATH - MEASURING

Purpose: To help student develop his sense of estimating distance both in standard and metric units.

Objective: The student will:
1. Demonstrate his ability to estimate length, width, height and circumference.
2. Demonstrate his ability to use different tools and skills to determine measurements.

SEE

ACTIVITY: MATH - MAPPING SMALL PLACES (See Boyscout Handbook For Information on Compasses)

Objective:

1. Children learn to take compass bearings.
2. Children learn to put compass study to practical use.

MATERIALS NEEDED:

1. small flags (rags tied to stick will do)
2. compasses (one for each pair of students)
3. tapes for measuring pace
4. map sheets with square drawn to scale, 7" perfect square on regular paper, at least one for each pair. Students make their own map square.

Preparation:

1. Children measure length of pace on marked course.
2. Children learn to read compasses.
3. Make square area to be mapped with flags at corners.

Activity:

1. Pairs are assigned stations on perimeter of square.
2. Children take compass bearing on each object within square to be marked on maps.
3. Children measure distance from perimeter to object by pacing and then compute in feet for maps.
4. Children mark maps showing locations as computed.

Evaluation: Children check maps against each others and check with teacher's master copy.

This exercise may have to be repeated several times before accurate measurement can be taken.

SEE
ACTIVITY: MATH - YARD CENSUS

Purpose: To help the student develop an awareness of the infinite variety of natural and man-made objects which are part of the environment.

Objectives: The student will:

1. Demonstrate his power of observation to identify natural and man-made objects.
2. Display his aesthetic values by pointing out those items which have low aesthetic value and those which have high aesthetic value.

Learning Activity: Many of you may have heard of the "people" census that the government takes every 10 years. In your yard there are many living things. There are also many things that man has put on the school site. Below is a check list. Take a walk around your yard and write down all of the things you see.

PLANTS OR ANIMALS

ant or ant hill	dandelion	flagpole
squirrel nest	clover	fence
wasp nests	wild strawberry	telephone pole
holes in ground made by insect	crab grass	sidewalk
bird nest	moss	parking lot
bird	shrub	play area
animal print	vine	trash cans
half eaten leaf	a yellow weed	fire plug
spider	lichen	stop signs
earthworm	gall	bicycle rack
grasshopper	evergreen	gutter
bee	broadleaf tree	light meter
insects on bark of tree	mushroom	transformer
pill bug (sowbugs)	tree-fruit	cement area (blacktop)

Answer these questions on the back of your paper.
Which animal do you think is the most numerous on the site?

Which plant has the greatest number?

Why does this plant grow so well on the school site?

Which of the man-made items are pretty?

Which are ugly?

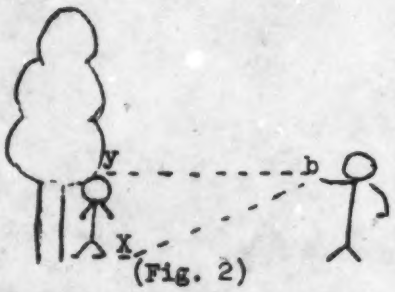
Could the ugly ones be made better looking? How?

2. Pencil Method - Have a friend of known height stand beside the tree. Stand at a distance from him and hold a pencil or short stick at arms length and sight across the top of it to point (y). Slide your thumb up or down on the stick until you are able to sight across the top of the thumb (b) to point (X). Keep your thumb in this position the remainder of the method. Move the pencil upward until you can sight across the top of your thumb to point (y). Now sight across the top of your stick to a new point on the tree. Repeat this until you have reached the top, keeping track of the number of measurement (xy) you have gotten. The height of the tree is this number times the known height of the person acting as a measurement. (See Fig. 2)

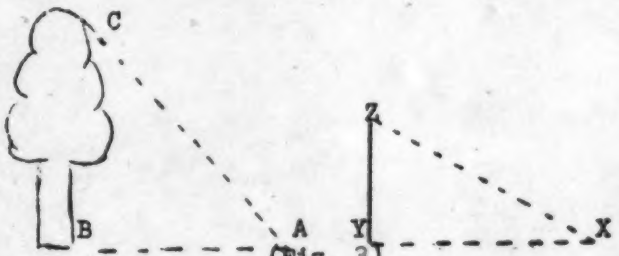
3. Shadow-Ratio Method - Measure the length of the tree's shadow (BA). Place a stick in a perpendicular position from the ground and measure its shadow. Both should be on the same slope. In the two similar triangles (CBA) and (ZYX) you now know two sides of the smaller and one side of the larger so a problem can be made: CB/ZY - BA/YX or $\frac{ZY \times BA}{YX}$. (See Fig. 3)

4. Biltmore Method - Glue a strip of hard paper or cardboard on one side of a yardstick. Begin at one end and make marks 6.15 inches apart and number the stick vertically at 25" from eye. Slide the stick up or down until the top of the stick is in line with the top of the tree. Without moving the head, sight to the bottom of the tree and see the place on the stick where the line of sight crosses it. Each number means a 16 feet length. (See Fig. 4)

5. Muddy Water Method - Place a basin of muddy water on the ground between you and the tree. Step back from the basin, a distance equal to that from your eyes to the ground. You should see the top of the tree reflected in the water. If not, move the basin back until this is possible. The distance from the basin to the foot of the tree is the height. (See Fig. 5)

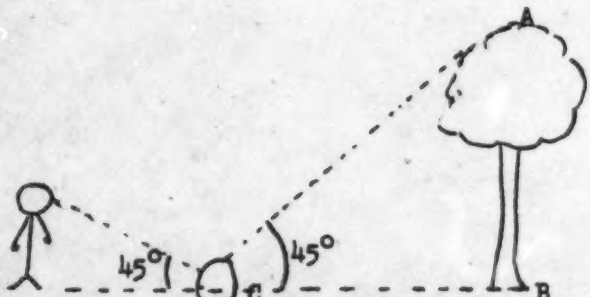


(Fig. 2)



(Fig. 3)

(Fig. 4)



(Fig. 5)

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Materials Needed: A tape measure or marked clothesline for each pair of students.

1.	Guess the distance between you and the nearest building.	Your Guess _____ft.	_____m
		Actual _____ft.	_____m
2.	Guess the height of the nearest building.	Your Guess _____ft.	_____m
		Actual _____ft.	_____m
3.	Guess the distance between fence posts.	Your Guess _____ft.	_____m
		Actual _____ft.	_____m
4.	Guess the height of a door.	Your Guess _____ft.	_____m
		Actual _____ft.	_____m
5.	Guess the circumference of a tree.	Your Guess _____in.	_____cm
		Actual _____in.	_____cm
6.	Guess the height of a flag pole (or length of bleachers if avail.)	Your Guess _____ft.	_____m
		Actual _____ft.	_____m
7.	Guess the width of a sidewalk	Your Guess _____in.	_____cm
		Actual _____in.	_____cm
8.	Guess the length of a big leaf	Your Guess _____in.	_____cm
		Actual _____in.	_____cm
9.	Other	Your Guess _____in.	_____cm
		Actual _____in.	_____cm
10.	Other	Your Guess _____ft.	_____m
		Actual _____ft.	_____m

(More items can be recorded on your own sheet)

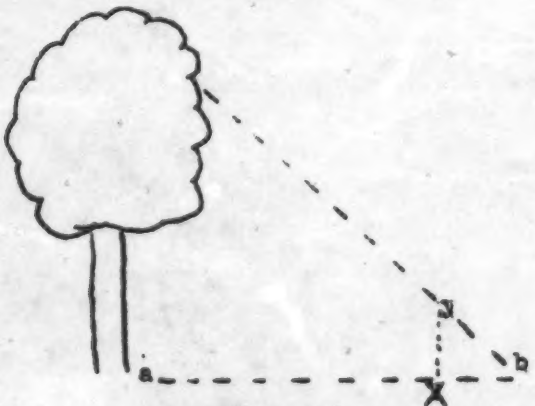
ACTIVITY: MATH - ESTIMATING THE HEIGHTS OF TREES AND BUILDINGS

Objective: By using mathematics in the outdoors children will better understand the relationship of mathematics in their daily lives.

Activities: Height of a tree or of a building can be estimated in several ways -

1. Inch to Foot - Starting from the tree (a), walk 11 steps or measure 11 units and mark the end point (X) with a long perpendicular stick; then measure one unit more and mark that point (b). Sight from point b across the stick to the top of the tree. Mark on the stick the point where your line of vision intersects the stick (y). Measure the distance from point (X) to point (y) in inches. This will be the height of the tree, in feet. (See Fig. 1)

Materials Needed: Measuring tapes or marked clothesline



(Fig. 1)

SEE

ACTIVITY: LANGUAGE ARTS - NOUNS-VERBS OUTSIDE

Objective: Students will be able to do a written review of action verbs. Students will associate nouns with the given verbs.

Learning Activities:

1. Using the verbs on this page, students will supply a noun (name of a person, place or thing) from what they observe outside. (Appropriate suffixes may be added - example: skips - skipped)
2. Students will then have an opportunity to add their own descriptive verbs and nouns to go with them.

Nouns	Verbs	Nouns	Verbs
	peep		skims
	sway		occur
	squeak		flies
	stalk		rang
	sting		torn
	collects		grab
	huddled		sounded
	buzz		carry
	mutter		rumble
	gurgled		shuffle
	swish		hum
	skips	You may add your own nouns and verbs here.	
	mixes	1.	
	whisper	2.	
	misses	3.	
	quiver	4.	
	march	5.	
	captured		

ACTIVITY: LANGUAGE ARTS - ADVERBS AND ADJECTIVES OUTSIDE

Objective: Students will be able to add descriptive words to describe things of nature. Students will be able to use adjectives and adverbs.

Learning Activities:

1. Use sheet on nouns and verbs.
2. In the extra space at the left of the first column, add an adjective to describe each noun the student wrote. (Adjectives tell which one, how many, what kind of and whose.)
3. In the extra space to the right of the second column, add an adverb to describe each verb. (Adverbs tell how, when or where. Please encourage students not to use an adjective or adverb more than once.

Some examples to start with:

Adjectives		Adverbs	
grassy	springy	seldom	swiftly
tame	firm	carefully	briefly
fuzzy	clear	lazily	highest
useful	calm	suspiciously	soon

SEE

ACTIVITY: LANGUAGE ARTS - CREATIVE WRITING - WRITING POETRY, COUPLETS AND TRIPLETS

Objectives: Students will be able to differentiate between a couplet and a triplet.
Students will be able to write an example of each.
Students will be able to get their ideas for poetry from nature.

Learning Activities:

1. Couplet - two lines of poetry that rhyme.
   EXAMPLES: The trees growing so tall,
   Make me feel quite small.

   I put the litter in its place,
   It put a smile on my face.

2. Write at least one couplet using something in nature to inspire you.
3. Triplet is much like a couplet, except that it has three rhyming lines.
   EXAMPLE: The little worm round,
   Made not a sound
   As he dug in the ground.

4. Look around and write a triplet about something you see.
5. Illustrate either your couplet or triplet.

ACTIVITY: LANGUAGE ARTS - DRAMATIZATION

Objective: Students will cooperate with one another to present a skit or charade.
Students will learn to improvise.

Learning Activities:

Students will, either individually or with one other student, be given action words to act out. (These should be actions influenced by nature or environmental things). Other students can guess what animal or other non-human thing it is and the action.
Examples: wiggle, crawl, gallop, squeak, quiver, march, trot, fly.
No spoken words are allowed.

2. Students will be placed in a group of 3-5 and they are to choose a problem in the environment to act out. (Give about 10-15 minutes preparation time.)
Examples: noise, traffic crowding, vandalism, (different types) litter, overpopulation, trash disposal.

SEE

ACTIVITY: SCIENCE - LOOKING FOR PLANT SUCCESSION

PURPOSE: To give an awareness that plant succession is an orderly change in the plant community.

OBJECTIVE: The student will develop a verbal explanation of what will occur if an area is untouched by man for a few hundred years.

LEARNING ACTIVITY: Observe, discuss, and list the following plants: Lichen, weeds, grass, bushes, trees. Explain their function and order of appearance.

NAME	FUNCTION	ORDER OF SUCCESSION

ACTIVITY: SCIENCE - SURFACE ANT - POPULATION STUDY

PURPOSE: Estimating population by selected samples of one foot or meter areas.

OBJECTIVE: The student will be able to estimate the population of a large field by small samples.

LEARNING ACTIVITY: Count the number of ants in three different square foot or meter areas (shade, sun, partly sunny). Add the three together and divide by three to find the average per square foot or meter. Pace off a field to find its length and width in either feet or meters, multiply the length times the width times the average ants per unit, gives the total surface ant population.